


Natural Hazard Mitigation Insights

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THE BENEFITS OF STATEWIDE BUILDING CODES

What is a Building Code?

A building code is the minimum acceptable standard used to regulate the design, construction, and maintenance of buildings for the purpose of protecting the health, safety, and general welfare of the building's users.

A Short History on Building Codes

Building codes have been around in some form for thousands of years. As is often the case, building codes are the afterthought of a tragedy rather than a forethought of prevention. As cities grew and experienced their own disasters, their building codes were developed based on individual experiences more than scientific knowledge. In 1905, the first national model building code was established in the United States, yet much of this code regulated the type of building components that could be used in construction and did not allow for newly developed materials. Modern building codes rely more on measurable performance rather than in the rigid specification of materials and methods. Modern codes are steeped in established scientific and engineering principles that have been thoroughly tested. Over the centuries, building codes evolved from regulations that came after a tragic experience, to regulations that can prevent tragic experiences.

Benefits of Building Codes

The purpose of building codes is to build safe buildings, thereby reducing deaths, injuries and property damage. This preserves the built environment, both residential and commercial, reduces public and private disaster aid, and maintains employment in businesses and institutions that otherwise might be forced to close following a catastrophe.

In addition, building codes promote a level and predictable playing field for designers, builders and suppliers. They promote a degree of comfort for buyers, who are

entitled to rely upon minimum construction standards for the safety and soundness of a building.

Building codes also allow economies of scale in the production of building materials and construction of buildings. Furthermore, building codes contribute to the durability of buildings and help maintain quality of life and property values.

Current Model Building Codes

Prior to 1994, model building codes were developed through three different organizations: Building Officials and Code Administrators International, Inc. (BOCA), the Southern Building Code Congress International, Inc. (SBCCI) and the International Conference of Building Officials (ICBO). These organizations published the National, Standard, and Uniform Building Codes, respectively. In 1994, these three organizations combined the codes to form the International Code Council, which released its first set of International Codes, or "I-Codes", in 2000.

Now, a few years later, even more model code development is taking place. The National Fire Protection Association (NFPA), a significant entity in the area of fire safety and loss prevention, has also developed its own set of codes. The NFPA 5000 Building Construction and Safety Code was published in the Fall of 2002.

These model codes are consensus documents that have input from leading technical experts in their fields as well as from enforcement personnel and the products industries. Each change to the codes is submitted and reviewed by all participants prior to approval.

As a result of new code development and merger of the organizations that previously developed code standards,

many states are in the process of examining or updating their existing codes. The Institute for Business & Home Safety (IBHS) provides technical expertise and input through its staff engineers and has produced resource material summarizing the status of code adoption across the country at www.ibhs.org.

The Problem with Variations in Building Codes

State standards for construction, code-related inspection, and enforcement vary widely across the country. Some states have adopted statewide building codes applicable to virtually every type of structure (residential, commercial, industrial, public, schools, hospitals, and farm buildings), while others employ lesser degrees of regulation and code applicability -- or none at all. Where statewide codes exist, it is not uncommon to allow individual jurisdictions (e.g., cities of a particular class or counties) to deviate from the state standard, often resulting in a weakening of the model minimum standard.

There are some jurisdictions that do not include one-and two-family dwellings in the application of building codes. Significant concern exists in regard to outer suburban (or semi-rural) areas where much new residential development is taking place. In these areas, with a concentration of residential construction, a lack of codes (or code enforcement) may mean that new homes are being built and sold with virtually no adherence to codes and that there is little control over how these buildings will perform, especially in natural disasters.

Why is it Important to Adopt a Code Without Weakening Amendments?

Statewide building codes -- and adequate enforcement of those codes -- play a vital role in public safety and loss prevention. In addition to saving lives and reducing property loss, statewide building codes based on nationally recognized models can reduce the need for public disaster aid; promote consistent guidelines for design professionals, suppliers and builders; create a minimum standard upon which consumers can rely; and contribute to the durability of structures.

Model building codes may need to be amended to meet the administrative needs and requirements of the governing community. However, provisions addressing design, construction or performance standards within these codes should not be changed in any way that will reduce the strength of the provisions. This will ensure that minimum safety and performance goals are met. Leading experts in the field of science, engineering, and building construction have developed the minimum standards to ensure safe

and predictable building performance. When technical content in local codes deviates from the standard codes, it should be allowed only to strengthen, rather than relax, code provisions. While local government and the building industry may raise objections to codes (often on the asserted basis of cost), it is clear that consumers, communities and builders, alike, benefit from effective building codes in the long run -- and the costs of code enforcement are clearly offset by the long term benefits. Recent benefit/cost studies have indicated that adopting stronger minimum code provisions for natural hazard vulnerability reduction have positive benefit/cost ratios ranging between 3 and 16. In other words, for each dollar increase in construction costs, there is a long term savings of 3 to 16 dollars. This concept is similar to environmental and energy benefits a consumer sees when purchasing a more efficient air conditioning system or more thermally efficient windows.

Federal Government

The Federal Emergency Management Agency (FEMA) supports the adoption and enforcement, without amendments, of 'disaster-resistant' building codes, which they regard as a cornerstone of effective mitigation. FEMA supports "disaster resistant" building codes, which means that the provisions meet the minimum requirements of the National Flood Insurance Program (NFIP), are substantially equivalent for seismic design to the 1997 or 2000 editions of the NEHRP Recommended Provisions published by FEMA, and reflect the current state-of-the-art engineering requirements for wind such as those found in the ASCE 7 standard. Currently, the 2003 edition of the International Building and Residential Codes (I Codes) and the new NFPA 5000 Building Construction and Safety Code meet these criteria.

Executive Order (E.O.) 12699 requires that all new federally owned, leased, regulated, or assisted buildings must be designed and constructed using a building code that meets a specific criterion. This criterion states that Federal agencies are permitted to use only those model building codes that have been determined to be substantially equivalent to a recognized seismic standard, which at this time are the 1997 and 2000 editions of FEMA's NEHRP Recommended Provisions. At this time, the 2003 I Codes and the NFPA 5000 meet that criterion. The impact to a community that chooses to adopt weakened versions of these model building codes is that any federal agency building, funding or other support for construction within that community be withheld unless the project is designed and constructed in accordance with one of the model codes that have been found to meet the intent of the E.O., such as the I Codes or the NFPA 5000, without amendment. Consequently, weakening the model codes

could adversely impact the availability of federally backed loans and disaster assistance grants.

There are also effects on post-disaster funding. Although there would be no effect on any immediate response funding, there could be an impact on recovery funding. FEMA regulations require that a community use whatever code was in place at the time of the disaster. Should the community have any additional requirement or desire to rebuild a structure to new code levels, FEMA would provide funding only to the level of the code in place at the time of the disaster. This could result in a differential that would be the responsibility of the community or the owner. For example, if an earthquake struck South Carolina today, FEMA would only provide resources based on the code in place at the time of the disaster. However, under E.O.12699, the grant recipients would be required to rebuild to a code that met the intent of the Executive Order, which would be the I Codes or the NFPA 5000. Thus, the recipients would be responsible for all differential costs between the weakened and published codes.

Performance Versus Prescriptive Codes

Codes are classified as performance codes if they require the completed work to satisfy specified standards (such as 120-mile-per hour hurricane winds) without describing in detail how to satisfy those standards. Codes are classified as prescriptive if they require that certain materials be used and describe how to build in some detail (e.g., use 8d nails, 6 inch o.c.). There are also variations that combine elements of performance and prescriptive codes.

Performance codes allow the designer and builder to use any combination of materials and methods that will provide the resistance necessary to satisfy the code. Such codes allow wide latitude, and some say this makes them more difficult to enforce. A plan reviewer or inspector may require additional information in order to determine how the combinations of materials and methods in a set of specifications will perform to satisfy the code requirements. Prescriptive codes, on the other hand, set forth in detail the materials and methods to be used. The plan reviewer and inspector can determine by observation if the code is being followed. Of course, the specifications set forth in the code have to be such that they satisfy minimum standards of performance, which should be stated in the code.

Enforcement is Critical

Good building codes have little value if they are not enforced. Independent studies of damage following Hurricane Andrew and the Northridge Earthquake revealed that lax code enforcement contributed to the total damage. Building codes are generally enforced by building departments at the local level. These departments are often funded by permit fees, which average less than one percent of construction costs. Plan reviewers and building inspectors are key to the success of building codes. Unless these functions are adequately funded and staffed with qualified, trained, tested and certified personnel, the full value of building codes will not be realized. It is important that all fees generated from building permits remain as revenue for the building department. The model codes have suggested permit fees at levels that will support the activities and training required for the building department.

Building Code Effectiveness Grading Schedule (BCEGS)

IBHS worked with the Insurance Services Office (ISO) in the development of a program where the enforcement capacity of a jurisdiction could be evaluated. ISO collects information related to personnel qualification and continuing education as well as number of inspections performed per day. This type of information, combined with local building codes, is used to determine a grade for that jurisdiction at the time of the evaluation. The grades range from 0 to 9 with the lower grade being more ideal. The jurisdictions are re-evaluated periodically, usually in 5-year intervals and are re-assessed. These evaluations are available to ISO's members in a similar fashion as the fire protection class information. Insurers can use BCEGS for policyholder credits, based on the performance of a jurisdiction and the building code being enforced. Adequate funding of the building department is critical to achieving favorable BCEGS ratings.

Summary

Building codes provide the minimum standards to which buildings can be legally constructed throughout the country. They are instituted to help ensure the safety and health of building occupants. Stronger codes are more cost-effective in the long run. To be effective, codes must be enforced by qualified personnel who are properly trained to ensure that the approved standard is met. Adequate funding for building departments is critical for their success in protecting individuals and the community.

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The Institute for Business & Home Safety is a nonprofit initiative of the insurance industry that is dedicated to reducing deaths, injuries, property damage, economic losses and human suffering caused by natural disasters.